BANNER®

the machine safety specialist

SELF-CHECKING
ANTI-TIEDOWN
Two-Hand-Control System

A diverse-redundant system for protection of machine operators' hands.

Banner has made hand protection safety systems even more reliable. When Banner's new STB Self-checking Optical Touch Buttons are used with Banner's new DUO-TOUCH® SG safety module, the world's first and only ergonomic self-checking, two-hand-control system is created. It's ergonomic because it requires no physical pressure to operate.

The first FMEA verified, self-checking touch buttons.

Similar to Banner's popular OTB buttons, the next generation STB Self-checking Optical Touch Buttons have an important addition—a unique design that uses an additional emitter and receiver for redundant self-checking of the primary emitter and receiver. These are the first optical touch buttons to provide the Failure Modes and Effects Analysis (FMEA) verified self-checking feature.* No other manufacturer of ergonomic touch buttons can make this claim.

* Patent pending. FMEA (Failure Modes and Effects Analysis) refers to a rigorous evaluation and test method needed to verify that internal failures will not cause an unsafe condition.

DUO-TOUCH® SG Safety Module.

This new two-hand-control safety module is designed to verify proper operations of two-hand-control devices, for increased control reliability in anti-tiedown applications. The DUO-TOUCH SG uses a diverse-redundant microcontroller circuit to monitor one normally-open and one normally-closed contact set on each hand control device. If either device is released, the DUO-TOUCH SG cancels its output signal.

- Dual-diverse microcontroller
- Two redundant, force-guided (positive guided) output contacts, rated at 6 amps
- Machine control elements are monitored by external device monitoring input
- Five indicator LEDs for Power, Fault, Input 1, Input 2 and Output
- 24V ac/dc operation

Dependable switching with no physical pressure required.

The STB Self-checking Optical Touch Button is a photoelectric-based, manual activation device designed to provide an ergonomic alternative to conventional mechanical push buttons and palm buttons. The STB creates a pulsed infrared beam that spans its touch zone. The buttons switch when their light beam is broken by a simple insertion of a finger. No pushing is necessary, eliminating the hand, wrist and arm stresses that may result from repeated push button operation. This reduces harmful tendon, nerve and neurovascular disorders.

Advanced diverse-redundant, dual-microcontroller design.

The STB features a new internal design based on dual microcontrollers. When the STB is activated, two separate outputs (one normally-open and one normally-closed) change state. The patent-pending STB circuit uses a diverse-redundant, self-checking design, that will detect an internal safety-critical circuit fault and immediately switch its outputs to the OFF state. It's designed to be used with Category 4, Type IIIC Two-Hand Control devices per EN 574. These devices monitor the STB outputs, detect the output change of state and respond accordingly.

Exceptional operator diagnostics.

The STB has two green LEDs to provide feedback about power, output state or fault conditions. The indicators are located on the front of the device.

- Green Power LED indicator turns on when STB is powered up
- Green Output/Fault LED indicator turns on when button is activated and outputs change to ON state
- Green Output/Fault LED flashes when STB microcontrollers detect an internal fault; outputs are held in OFF state

Rugged and reliable.

The STB is rugged and reliable, meeting NEMA 1, 3, 4, 4X, 12, 13 and IEC IP66 standards. It is resistant to even the most difficult and contaminated environments.

- Immune to ambient light, EMI and RFI interference
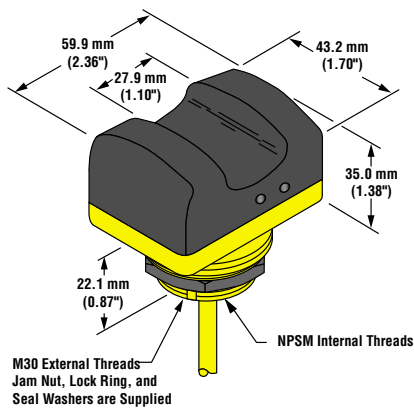- High excess gain cuts through heavy contamination

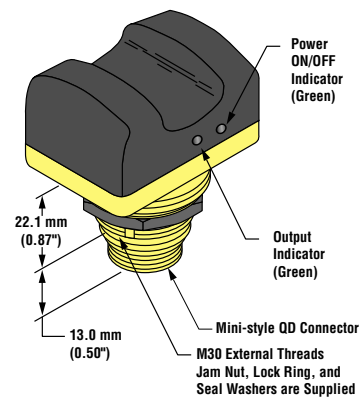| Models	Part Number	Cable	Upper Housing	Supply Voltage	Output Type	DUO-TOUCH® SG Compatibility
STBVP6 STBVP6Q STBVP6Q5	64179 64180 64181	4-wire 2 m (6.5') integral cable 4-Pin Mini-style QD 4-Pin Euro-style QD	Polysulfone	10 to 30V dc	Complementary PNP	AT-FM-10K
STBVR81 STBVR81Q STBVR81Q6	64190 64191 64192	5-wire 2 m (6.5') integral cable 5-Pin Mini-style QD 5-Pin Euro-style QD	Polysulfone	20 to 30V ac/dc	Two Individual & Complementary Relays	AT-FM-10K
STBVP6L STBVP6LQ STBVP6LQ5	64182 64185 64189	4-wire 2 m (6.5') integral cable 4-Pin Mini-style QD 4-Pin Euro-style QD	Lexan®	10 to 30V dc	Complementary PNP	AT-FM-10K
STBVR81L STBVR81LQ STBVR81LQ6	64193 64194 64195	5-wire 2 m (6.5') integral cable 5-Pin Mini-style QD 5-Pin Euro-style QD	Lexan®	20 to 30V ac/dc	Two Individual & Complementary Relays	AT-FM-10K

Notes:

i) 9 m (30') cables are available by adding suffix **"W/30"** to the model number of any cabled STB (e.g., **STBVP6 W/30**).

ii) QD models require an accessory QD cable.

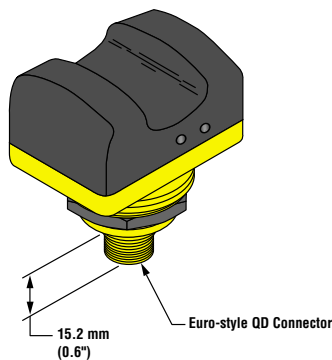iii) STB models are not compatible with AT-..M-2A DUO-TOUCH modules, due to power input requirements.
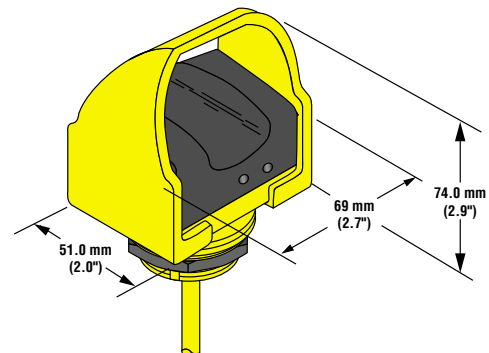
Integral Cable

59.9 mm (2.36")
27.9 mm (1.10")
43.2 mm (1.70")
35.0 mm (1.38")
22.1 mm (0.87")
M30 External Threads
Jam Nut, Lock Ring, and Seal Washers are Supplied
NPSM Internal Threads

Mini-Style Quick-Disconnect

Power ON/OFF Indicator (Green)
Output Indicator (Green)
22.1 mm (0.87")
13.0 mm (0.50")
Mini-style QD Connector
M30 External Threads
Jam Nut, Lock Ring, and Seal Washers are Supplied

Euro-Style Quick-Disconnect

15.2 mm (0.6")
Euro-style QD Connector

With Field Cover

74.0 mm (2.9")
69 mm (2.7")
51.0 mm (2.0")

Supply Voltage and Current	**STBVP6 Models:** 10 to 30V dc **STBVR81 Models:** 20 to 30V ac/dc
Supply Protection Circuitry	Protected against transient voltages and reverse polarity
Output Configuration	**STBVP6 Models:** Complementary PNP (sourcing) open-collector transistors **STBVR81 Models:** Complementary electromechanical relays

Output Rating	**STBVP6 Models (solid-state outputs):**
	    Maximum load: 150 mA
	    On-state saturation voltage: $\leq$ 15V @ full load
	    Off-state leakage current: < 1 µA)
	
	STBVR81 Models (electromechanical relays):
	    Maximum switching voltage: 150V dc, 125V ac
	    Maximum switching current: 1A
	    Maximum resistive load power: 60 VA dc, 30 W dc
	    Mechanical life of relay: 10^9 cycles
	    Electrical life of relay: 3×10^6 cycles 1A, 24V resistive

Output Protection	All models protected against false pulse on power-up. Models with solid-state outputs have overload and short-circuit protection.
Response Time	20 milliseconds on/off

Indicators	**2 green LED indicators:**
	Power: ON – power applied
	              OFF – power off
	Output/fault: ON – button is activated
	              OFF – button is deactivated
	              Flashing – internal fault or blocked button on power-up detected

Construction	Totally encapsulated, non-metallic enclosure. Black polysulfone or red Lexan® polycarbonate upper housing (see Application Notes below); fiber-reinforced PBT polyester base. Electronics fully epoxy-encapsulated. Supplied with polypropylene (TP) field cover.
Environmental Rating	Meets NEMA standards 1, 3, 4, 4X, 12 and 13; IEC IP66
Connections	PVC-jacketed 2 m (6.5') cables (standard on integral-cable kits); or QD fitting, depending on model. Accessory QD mating cables required for QD models. **STBVP6 Models:** 4-wire (4-pin Mini-style QD) **STBVR81 Models:** 5-wire (5-pin Mini-style QD) Integral 9 m (30') cables are also available.
Ambient Light Immunity	Up to 100,000 lux
EMI/RFI Immunity	Immune to EMI and RFI noise sources per IEC 947-5-2
Operating Conditions	**Temperature:** 0° to +50°C (+32° to +122°F) **Maximum relative humidity:** 90% @ +50°C (non-condensing)
Application Notes	**Environmental considerations for models with polysulfone upper housings:** The polysulfone upper housing will become brittle with prolonged exposure to outdoor sunlight. Window glass effectively filters longer wavelength ultraviolet light and provides excellent protection from sunlight. Avoid contact with strong alkalis. Clean periodically using mild soap solution and a soft cloth. **Environmental considerations for models with Lexan® upper housings:** Avoid prolonged exposure to hot water and moist high-temperature environments above 66°C (150°F). Avoid contact with aromatic hydrocarbons (such as xylene and toluene), halogenated hydrocarbons and strong alkalis. Clean periodically using mild soap solution and a soft cloth.

WARNING … Not a Stand-Alone Safety Device

STB Self-checking Optical Touch Buttons are intended to be part of a type IIIC two-hand-control system, and are not, by themselves, safety devices. To be used in a safety application, the STB **must** be interfaced with a type IIIC two-hand-control module, such as the Banner AT-FM-10K, in order to meet all relevant safety requirements of the appropriate standards.

DUO-TOUCH SG Safety Module

Model (Part Number)	Enclosure	Response	Supply Voltage	Output Type	Timing Diagram
AT-FM-10K (60698)	Polycarbonate NEMA 1 (IEC IP20)	35 ms (off)	24V ac/dc	Two redundant safety relay contacts	

Kits are available which include one DUO-TOUCH SG Safety Module and two STB Touch Buttons; see chart below.

STB Self-checking Optical Touch Buttons are also available separately, see page 4.

* Feedback loop can remain closed at all times (if jumpered), when no monitoring contacts are available.

DUO-TOUCH SG Kits

KITS		COMPONENTS				
Includes 2 STB Touch Buttons & a DUO-TOUCH SG Module		DUO-TOUCH SG Safety Module	STB Self-checking Optical Touch Buttons			Supply Voltage
Models	Part Number		Models	Outputs	Cable/Connector*	
ATK-VP6	64290	AT-FM-10K	STBVP6	PNP	4-wire 2 m (6.5') integral cable	10 to 30V dc
ATK-VP6Q	64291	AT-FM-10K	STBVP6Q	PNP	4-Pin Mini-style QD	10 to 30V dc
ATK-VR81	64287	AT-FM-10K	STBVR81	Relay	5-wire 2 m (6.5') integral cable	20 to 30V ac/dc
ATK-VR81Q	64288	AT-FM-10K	STBVR81Q	Relay	5-Pin Mini-style QD	20 to 30V ac/dc

* 9 m (30') cables are available by adding suffix "**W/30**" to the kit model number including any cabled sensor (e.g., **ATK-VP6 W/30**).
  QD models require an accessory QD cable.

Supply Voltage and Current	24V ac/dc ±15% at 150 mA
Supply Protection Circuitry	Protected against transient voltages and reverse polarity (dc hookup is without regard to polarity)

Output Configuration	Outputs (K1 and K2): two redundant (total of four) forced-guided safety relay contacts
	     Contact ratings:
	     Maximum voltage: 250V ac or 250V dc
	     Maximum current: 6A ac or dc (resistive load)
	     Maximum power: 1500 VA, 150 watts
	     Mechanical life: 50,000,000 operations
	     Electrical life: 150,000 cycles (typically @ 1.5 kVA switching power)
	NOTE: Transient suppression is recommended when switching inductive loads. Install suppressors across load. Never install suppressors across output contacts.

Output Response Time	35 milliseconds maximum ON/OFF
Input Requirements	Outputs from both hand controls (1 N.O. and 1 N.C.) must each be capable of switching 10 to 50 mA @ 18 to 30V dc.
Simultaneity Monitoring Period	≤500 milliseconds
Status Indicators	**4 green LED indicators:** **1 red LED indicator:** Power ON Fault Input 1 energized Input 2 energized Output
Housing	Polycarbonate. Rated NEMA 1 (IEC IP20)
Mounting	Mounts to standard 35 mm DIN rail track. Safety modules must be installed inside an enclosure rated NEMA 3 (IEC IP54), or better.
Vibration Resistance	10 to 55Hz @ 0.35 mm displacement per IEC 68-2-6
Operating Conditions	**Temperature:** 0° to +50°C (+32° to 122°F) **Maximum Relative Humidity:** 90% @ +50°C (non-condensing)
Dimensions	See dimension drawing below.
Safety Category	4 per EN 954-1; Type IIIC per EN 574
Certifications	Approvals in process. Contact factory for more information.

22.5 mm
(0.89")

118.0 mm
(4.65")

84.0 mm
(3.31")

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